EPA/AMD/R02-99/098
1999

EPA Superfund
Record of Decision Amendment:

WOODLAND ROUTE 72 DUMP and WOODLAND ROUTE 532 DUMP
EPA ID: NJD980505879 and NJD980505887
OU(s) 01 & 01
WOODLAND TOWNSHIP, NJ
07/01/1999

SUPERFUND RECORD OF DECISION AMENDMENT

WOODLAND TOWNSHIP ROUTE 72 SITE
WOODLAND TOWNSHIP ROUTE 532 SITE
WOODLAND TOWNSHIP, BURLINGTON COUNTY
NEW JERSEY

Prepared by: N. J. Department of Environmental Protection
Site Remediation Program
Bureau of Federal Case Management
April 1999

DECLARATION FOR THE RECORD OF DECISION AMENDMENT

SITE NAME AND LOCATION

Woodland Township Route 72 Site
Woodland Township Route 532 Site

Woodland Township, Burlington County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This Record of Decision presents the selected remedial action for the Woodland Township Route 72 and Route 532 Sites, which has been chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This Record of Decision explains the factual and legal basis for selecting the remedy.

The US Environmental Protection Agency (EPA) concurs with the selected remedy. This Record of Decision is based on the administrative record file for these sites.

ASSESSMENT OF THE SITES

Actual or threatened releases of hazardous substances from the Woodland Township Route 72 and Route 532 Sites, if not addressed by implementing the response action selected in this Record of Decision Amendment, may present an imminent and substantial threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy addresses the contaminated ground water at the Woodland Township Route 72 and Route 532 Sites. The major components of the selected remedy include the following:

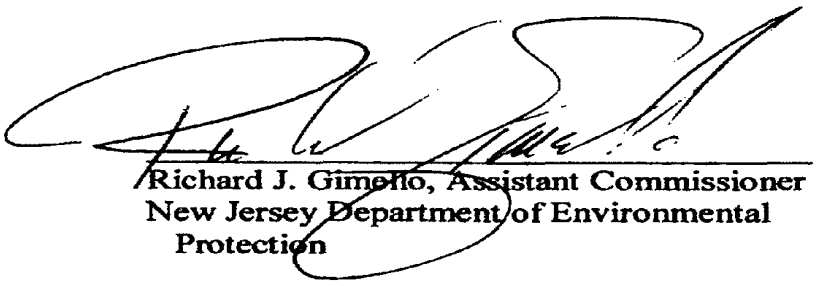
- Ground water in the site disposal areas at both the Route 72 and Route 532 Sites will be remediated using an air sparging system to inject air into the saturated zone and strip away volatile and semi-volatile organic compounds dissolved in ground water and adsorbed to the soil, a soil vapor extraction system to capture sparged vapors, and a vapor treatment system to treat the soil vapor extraction offgas.

- The downgradient portion of the plumes at both sites will be allowed to naturally attenuate.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy is a permanent remedy and satisfies the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining in the ground water downgradient of the Site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that it continues to provide adequate protection of human health and the environment.



Richard J. Gimello, Assistant Commissioner
New Jersey Department of Environmental Protection

2/1/89
Date

TABLE OF CONTENTS

INTRODUCTION

The Woodland Township Route 72 site and Woodland Township Route 532 site are located in Woodland Township, Burlington County, New Jersey. Both sites are situated within the Preservation Area District of the New Jersey Pinelands. The Route 532 site also falls within the designated "special agricultural area" of the Pinelands. Both sites were used as disposal facilities for waste materials during the 1950s.

The New Jersey Department of Environmental Protection (NJDEP) is the lead agency that has overseen activities at the Woodland Township Sites since 1985 under various Administrative Consent Orders (ACOs). The U.S. Environmental Protection Agency (EPA) is the support agency. Both sites were listed on the National Priorities List (NPL) in September 1983. Current site work is being performed under an August 15, 1991 ACO (ACO IV) between NJDEP and Hercules, 3M, and Rohm and Haas.

As with many Superfund sites, the problems at the Woodland Township Route 72 and Route 532 sites are complex. As a result, NJDEP has organized the remedial work into two operable units. Operable Unit One addressed the contaminated surface material and the contaminated ground water at both sites. Operable Unit Two addressed the subsurface soils.

The Record of Decision (ROD), signed on May 16, 1990, documented the selection of the remedial action for Operable Unit One. Under the 1990 ROD, the contaminated surface materials were disposed of at an off-site facility. This work was conducted under ACO III (dated June 15, 1990) and was completed in 1990. The ROD also required treatment of contaminated ground water by extraction and treatment. It was specified in the ROD and ACO IV that various studies be conducted prior to implementation of the ground water extraction and treatment remedy. These studies consisted of a bench-scale treatability test for extracted ground water, a ground water flow model, an ecological risk assessment, an environmental/resource inventory, and an evaluation of ground water remedial approaches. These studies then led to the determination that air sparging and soil vapor extraction is a more appropriate remedy for the sites because this technology will remediate the on-site ground water contamination in less time and at a substantially lower cost than ground water extraction and treatment. In addition, air sparging-soil vapor extraction will not affect the level of the ground water table as the ground water extraction and treatment remedy would, thereby being more protective of the wetlands.

The Proposed Plan for the ROD Amendment was released to the public for comment on September 22, 1998. This document as well as all the reports and documentation related to this Record of Decision Amendment were made available to the public in both the administrative record and information repositories indicated below. The notice of availability for these documents was published in the *Burlington County Times* on September 22, 1998. A public comment period on the documents was held from September 22, 1998 to October 22, 1998 (30 calendar days). In addition, a public meeting was held on October 8, 1998. At this meeting NJDEP representatives answered questions about the proposed remedy at the sites. A response to comments raised at the public meeting as well as comments received in writing is included in the Response Summary,

which is part of this ROD Amendment. In accordance with the NCP, section 300.825(a)(2), this ROD Amendment will become part of the Administrative Record File. The Administrative Record may be found at the following locations:

Woodland Township Municipal Building
Main Street
Chatsworth, NJ 08019
(609) 726-1700

NJ Department of Environmental Protection
Bureau of Community Relations, Floor 6
401 East State Street, P.O. Box 413
Trenton, NJ 08625
(609) 984-3081

SITE BACKGROUND

The Route 72 site is approximately 12 acres in size and is located on tax block 5501, lot 15 and tax block 6301, lot 1. The site is 1/4 mile south of Route 72 along Crawley Road. Crawley Road is labeled as Sooey Road on United States Geological Survey maps. Crawley Road meets Route 72 approximately 1 and 1/3 miles southeast of the intersection of Route 532 and Route 72. Approximately 800 acres of wetlands, including cedar swamp, bog hardwood swamp, and pitch-pine lowland are located in close proximity to the Route 72 site. Pope Branch, an intermittent stream, is located approximately 500 feet to the north and 1,000 feet west of the site. An active commercial cranberry bog is located approximately 1/2 mile northwest of the site.

The Route 532 site is approximately 20 acres in size and is located on tax block 4210, lot 1. The site is at the end of an access road approximately 1/8 mile south of Route 532. The unnamed site access road meets Route 532 approximately 1 and 1/8 miles west of the intersection of Route 532 and Route 72. Goodwater Run, an intermittent stream, and Bayley Road border the site to the east. An unpaved forest fire control road runs along the southern edge of the site. More than 200 acres of wetland including cedar swamp, bog, hardwood swamp, and pitch-pine lowland are located downgradient of the former disposal area of the Route 532 Site. Active commercial cranberry bogs are located approximately 1 mile west-southwest of the site.

One private residence is located within a 3-mile radius of each site. The sites are approximately 3 miles apart and are at an average elevation of 125 feet above mean sea level. Both sites are characterized by loose sandy soils.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Route 72 Site

Francis Estlow owned the Route 72 site until 1957, when the property was purchased by Rudolf Kraus. Rudolf and/or Eleanor Kraus also owned Industrial Trucking Services Corporation, the company that reportedly transported the waste materials to the sites for disposal. Cohen, Weiss and Krell purchased the property in April 1964. It is unclear from Woodland Township records when the property was acquired by its current owner, Airtime, Inc.

A 1951 aerial photograph of the site illustrates conditions prior to the waste disposal operation. Probable concrete pads, possible basement space, a utility building and a sidewalk can be observed. An unpaved road connected the site to the perimeter road of the Coyle Airport. Crawley Road and a fire road north of the site were also present.

A 1956 photograph shows several trenches elongated in an east-west direction on the northern third of the site. The trenches were located on both sides of Crawley Road. The central portion of the site was covered with general refuse and stained soils. Small depressions containing standing liquid were evident on the western half of the site. The southern portion of the site west of Crawley Road contained a wide depression with standing liquid in it. The southern portion east of Crawley Road contained several shallow trenches oriented along a north-south axis.

Between 1956 and 1962, the site layout remained unchanged based on a 1962 photograph. However, the trenches were apparently deepened, and those in the northern and southern portions of the site contained a standing light-colored liquid.

A 1984 photograph did not identify any changes to the site since 1962. The outlines of trenches and depressions could be observed. Drums, stained soils, and general refuse were identifiable in the central portion of the site. Much of the pine forest at the edge of the site had regenerated, while on-site disposal areas remained unvegetated. This site was also uncontrolled between 1962 and 1986. In 1986, the Potentially Responsible Parties (PRPs) constructed a security fence to restrict site access.

Route 532 Site

Early records indicate ownership of the Route 532 site by Francis Estlow. In 1973, Estlow sold the property to Cohen, Weiss and Krell. In 1976, Airtime, Incorporated purchased the property and subsequently sold it to its present owners, Joseph and Albert Spitzer.

An aerial photograph from 1951 shows that a pine forest existed in the study area prior to the beginning of disposal operations. The exact date disposal began is unknown; however, it is estimated to have begun between 1951 and 1956. The western half of the Route 532 site was organized into a series of bermed lagoons when the disposal began. A 1956 photo indicated these lagoons contained black liquid waste. It was also evident from the

photograph that this waste was released along an on-site road and flowed toward a depression.

By 1962, most of the disposal areas had been regraded. In a 1962 aerial photograph, new bulldozer scrape marks indicate that the disposal area was being enlarged. The black liquid, previously dumped on site, had also breached the lagoon berm and was flowing into the nearby pine forest. A second flow was observed extending from the eastern border toward the path of Goodwater Run.

A 1984 photograph indicated that the site remained essentially unchanged between 1962 and 1984. Denuded areas could be observed where the two liquid flows moved off site. The photograph also shows partially buried drums on the down-slope edges of the former lagoons and road on the western half of the site. Partially buried drums and general refuse were piled along former roads on the eastern half of the property at that time. No site controls were in place from 1962 to 1986. In 1986 the PRPs constructed a security fence to restrict site access.

Enforcement Activities

The Burlington County Health Department in April 1979 advised the NJDEP of environmental problems at the sites. The NJDEP subsequently conveyed the information to the USEPA. At about the same time, a biologist investigating endangered species for the NJDEP also reported environmental problems at the sites.

Due to similarities at the two sites (i.e., PRPs, waste disposal practices, location and physical/chemical characteristics), enforcement efforts for the sites have been combined. The NJDEP issued a directive on March 4, 1985 to the Rohm and Haas Company, the Minnesota Mining and Manufacturing (3M) Company, Hercules, Inc., and other companies identified as PRPs to arrange for the investigation and remediation of the sites. On March 27, 1985 the NJDEP entered into an Administrative Consent Order (ACO) with Hercules, Incorporated to help pay for the investigative and administrative costs. On July 6, 1987, the NJDEP entered into a similar ACO with 3M and Rohm and Haas Company.

On January 2, 1990, the NJDEP entered into a second Administrative Consent Order (ACO II) with Hercules, 3M, and Rohm and Haas. The purpose of this ACO was to compel the PRPs to remove liquids and sludges from isolated locations on the sites' surfaces.

On May 16, 1990 a Record of Decision (ROD) was signed for Operable Unit 1. The selected remedy in this ROD included the following:

<u>Surface Materials</u>

- Excavation and further characterization of 54,000 cubic yards of contaminated surface materials and sediments (soils, sludges, debris, etc.) and 19 cubic yards of radiologically contaminated surface materials.

- Disposal of the excavated materials at a permitted off-site facility.

Ground Water

- Extraction of the contaminated ground water plume, and treatment of the extracted ground water prior to reinjection.

- Conduct the following assessments prior to the remedial design of the ground water system: endangered species survey, biological survey, wetlands delineation and assessment, floodplain impacts, and cultural resources survey.

The excavation and off-site disposal of the surface materials was conducted in 1990. The actual amount of contaminated materials and sediments removed from the Route 72 and 532 sites was 37,200 and 60,200 cubic yards, respectively, compared to the ROD estimate of 54,000 cubic yards. Part of the reason for the higher volumes is that much of the contaminated subsurface soils were removed along with the removal of the visibly contaminated surface materials. These soils had been acting as a source of continuing contamination of the ground water. The excavation of the soil was intended to minimize cross-media impacts of contaminated soil on the ground water. The removal of additional subsurface soils further reduced these impacts.

Subsequent to the excavation of the contaminated surface materials, the sites were graded to prevent soil erosion. Protective vegetative and mulch covers were also established to prevent erosion. The May 1990 ROD called for final restoration of the sites after the remedial actions were completed.

On August 15, 1991, the fourth ACO (ACO IV) was signed with Hercules, 3M, and Rohm and Haas. The purpose of this ACO was to require the PRPs to extract and treat contaminated ground water as specified in the ROD and to perform a remedial investigation and feasibility study (RI/FS), and remedial action, if necessary, for the subsurface soils. Based on the data collected in the RI, it was determined that no remediation was needed for the subsurface soils and a "No Further Action" ROD was issued in September 1993.

RESULTS OF THE VARIOUS STUDIES

A Remedial Investigation (RI) was conducted in three phases from 1985 through 1989. The RI activities primarily consisted of sample collection and analysis of soils, wastes, ground water, potable wells, air, surface water, sediments, and cranberries. It was determined that ground water was contaminated at both sites with various volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics. The various contaminants include 1,2-dichloroethane, 1,1,2,2-tetrachloroethane, bis(2-chloroethyl)ether, benzene, and toluene. Tables 1 and 2 list all the contaminants and the maximum concentrations found at the Route 72 and Route 532 Sites, respectively.

As part of the RI, a baseline Risk Assessment was prepared. For the ground water portion of the assessment, it was assumed that human beings would live at both sites in the future and would use the ground water for household activities. The exposure pathways that were considered were dermal absorption, ingestion, and inhalation of contaminants from ground water beneath the sites.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. A HI greater than 1 indicates that adverse non-carcinogenic effects may occur.

For the Route 72 Site, a total carcinogenic risk greater than $2x\ 10^{-1}$ (2 in 10) was calculated for ground water use, which exceeds a target risk of $1x10^{-6}$. The non-carcinogenic hazard exceeded the HI of 1, indicating a potential cause of concern to human health. For the Route 532 site, a worst case carcinogenic risk of $1x10^{-2}$ (1 in a hundred) was calculated and the non-carcinogenic hazard exceeded the HI of 1. For both the Route 72 and Route 532, there are no present risks since the contaminated ground water is not being used as drinking water at this time. This information is documented in the report entitled *Remedial Investigation/Feasibility Study for the Woodland Township Route 532 and Route 72 Hazardous Waste Sites*, dated July 1989.

Treatability studies for extracted ground water were conducted in 1992 and 1993. It was determined that the ground water could be treated to rneet the treatment objectives. This information is documented in *Groundwater Treatability Studies for the WPSG Route 532 and Route 72 Sites*, dated December 1993.

The ground water flow model was developed to predict the outcome of various ground water extraction and discharge scenarios and to predict the fate of contaminants in the Cohansey Aquifer. The model was developed to evaluate ground water and wetlands impacts associated with the ground water extraction and treatment system. The model results indicated that ground water extraction of the entire downgradient plume, as specified in the ROD, would dewater 2.2 square miles of wetlands and surface water bodies within and adjacent to areas overlying the downgradient portion of the ground water plume. In addition, the model results indicated that an upgradient recharge scenario could result in raising the water table up to 20 feet, thereby having a negative impact to the uplands.

Ecological risk assessments were performed to estimate the ecological risk associated with the downgradient discharge of site-related compounds to potential receptors. The ecological risk assessments indicated that the risk to receptors in the downgradient

wetlands from chemicals discharging from ground water was negligible at the Route 72 site and no measurable impact to the ecosystem related to the ground water plume was observed or anticipated in the surface water and wetlands downgradient of the Route 532 site. This information is documented in the reports entitled *Ecological Risk Assessment, Route 72 Groundwater Plume,* dated September 1994 and *Ecological Risk Assessment, Wetland Study Area, Route 532 Superfund Site, Woodland Township, Burlington County, New Jersey*, dated April 4, 1995.

An assessment of environmental impacts associated with the ground water extraction and treatment remedy was completed to satisfy the requirements of the ROD and ACO IV to protect human health, the environment, and the sensitive New Jersey Pinelands environment. Several reports were prepared addressing downgradient sampling results and ecological considerations at, and downgradient of, the sites. These reports determined that there was no apparent ecological stress in the study area stream system related to the discharge of the Route 72 ground water plume; there were no measurable impacts associated with the downgradient ground water plume of the Route 532 site on the wetlands, cranberry bogs, and harvested cranberries; and the Shoal Branch and its wetlands prevent further travel of the Route 72 ground water plume to Dukes Bridge. In addition, 14 critical environmental and ecological resources that could be impacted by remediation of the sites were identified. They included wetlands, wetland transition areas, floodplain, streams, hydrologic resources, species of concern, soils, cultural resources, rare natural communities, fire ecology, agricultural resources, topographic resources, recreational land use, and scenic resources. The detailed evaluation of ground water remediation approaches evaluated various remedial alternatives and recommended air sparging and soil vapor extraction as the most promising alternative because of its ability to actively and directly remediate the chemical mass residing in the subsurface at the disposal areas of the sites. This information is documented in the reports entitled *Final Draft Environmental Constraints Analysis Route 532 Superfund Site, Woodland Township, Burlington County, New Jersey*, dated October 4, 1993; *Final Draft, Route 72 Superfund Site Environmental Resources Inventory, Woodland Township, Burlington County, New Jersey*, dated October 1994; *Detailed Evaluation of Groundwater Remedial Approach, Part III of III - Remedial Alternatives Analysis (Final Draft), Route 72 Site, Woodland Towwship, New Jersey*, dated June 10, 1996; and *Detailed Evaluation of Groundwater Remedial Approach, Part III of III - Remedial Alternatives Analysis, (Final Draft), Route 532 Site, Woodland Township, New Jersey*, dated June 13, 1996.

In 1996, an air sparging and soil vapor extraction field demonstration was conducted at both sites. The results showed that chemical mass can be rapidly reduced. Ground water concentrations were reduced by 1 to 3 orders of magnitude at locations 10 to 15 feet away from the sparging well in a matter of weeks. The results of this field demonstration are documented in the *Field Demonstration Report Air Sparging and Soil Vapor Extraction (Final Draft), Route 72 and Route 532 Superfund Sites, Woodland Township, New Jersey*, dated November 18, 1996.

The *Final Focused Feasibility Study, Route 72 and Route 532 Sites, Woodland Township, Burlington County, New Jersey*, dated August 14, 1997, was then prepared which

compared the ground water extraction and treatment remedy in the ROD with the air sparging and soil vapor extraction alternative.

BASIS FOR THE ROD AMENDMENT

Under 1990 ROD, ground water was to be treated by extraction of the contaminated ground water plume, treating the extracted water, and then reinjecting the treated water back into the aquifer. Treatment would consist of air shipping, metals removal, biological treatment, and advanced oxidation or carbon adsorption. At the Route 72 site, the entire plume would be treated. At the Route 532 site, the downgradient portion of the plume would be allowed to naturally attenuate.

Various studies were conducted subsequent to the ROD to fulfill the requirements of the ROD and ACO IV. The environmental impacts associated with the ground water extraction and treatment remedy were assessed and it was determined that there was no apparent ecological stress in the study area stream system related to the discharge of the Route 72 ground water plume; there were no measurable impacts associated with the downgradient ground water plume of the Route 532 site on the wetlands, cranberry bogs, and harvested cranberries; and the Shoal Branch and its wetlands prevent further travel of the Route 72 ground water plume to Dukes Bridge. In addition, fourteen critical environmental and ecological resources that could be impacted by remediation of the sites using the ground water extraction and treatment remedy were identified. They included wetlands, wetland transition areas, floodplain, streams, hydrologic resources, species of concern, soils, cultural resources, rare natural communities, fire ecology, agricultural resources, topographic resources, recreational land use, and scenic resources. The detailed evaluation of ground water remediation approaches evaluated various remedial alternatives and recommended air sparging and soil vapor extraction as the most promising alternative. In 1996, an air sparging and soil vapor extraction field demonstration was conducted at both sites. The results showed that chemical mass in the ground water was rapidly reduced. Based on the results of the various studies and the field demonstration, in 1997 the PRPs requested that NJDEP and EPA consider allowing air sparging and soil vapor extraction instead of ground water extraction and treatment for the remediation of the ground water at both sites.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. The following remedial action objectives were established for the ground water:

- The ground water at the site is classified as 1-PL (Preservation Area). Pursuant to the Ground Water Quality Standards (N.J.A.C. 7:9-6 et seq.), the ground water quality criterion for Class 1-PL areas is the natural quality for each constituent. For a constituent whose natural quality level is less than the Practical Quantitation Level (PQL), which is the lowest concentration of a constituent that can be reliably detected during routine laboratory operating conditions, then the PQL is the Ground Water

Quality Criterion. The Ground Water Quality Criteria for various contaminants are listed in Table 3.

- Adverse environmental impacts and permanent ecological damage in sensitive areas must be avoided.

- Human health and the environment must continue to be protected through remediation and institutional controls.

- A standard of performance equivalent to the ground water extraction and treatment remedy specified in the ROD must be attained.

- All parts of the ground water plume containing chemical concentrations exceeding either the NJDEP's Ground Water Quality Standards or the Federal MCLs must be remediated. Ground water within the site disposal areas that is considered to potentially impact ground water quality downgradient will be actively remediated, while remaining areas outside of the vertical and horizontal extent of these areas will naturally attenuate. Those areas where ground water contains aromatic hydrocarbon concentrations in excess of one percent solubility or 1,2-DCA concentrations in excess of 100 times the ground water quality standard are considered areas impacting ground water quality.

  For the Route 72 site, the ROD required that the entire plume be treated using the pump and treat remedy to prevent ground water contamination from impacting the potable wells in Dukes Bridge. Investigations conducted after the ROD have determined that the ground water contaminant plume discharges into Shoal Branch and does not threaten the potable wells of Dukes Bridge. This ROD Amendment allows the downgradient contaminant plume to naturally attenuate, which differs from the 1990 ROD.

  For the Route 532 site, the 1990 ROD specified that the downgradient portion of the contaminant plume be allowed to naturally attenuate. This ROD Amendment also provides that the downgradient portion of the contaminant plume be allowed to naturally attenuate.

DESCRIPTION OF ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621 (b)(1), mandates that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions that employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants and contaminants, which at least attains ARARs under federal and state laws,

unless a waiver can be justified pursuant to CERCLA §121(d) (4), 42 U.S.C. §9621 (d)(4).

This amended ROD evaluates in detail two remedial alternatives for addressing the ground water contamination at the Woodland Township Route 72 and Route 532 sites. The time to implement each remedial alternative reflects the time required to design and construct or implement the remedy. The costs presented for each alternative include capital costs and operation and maintenance (O&M) costs over a thirty year period.

The remedial alternatives are:

Alternative 1: Ground Water Extraction and Treatment (Remedy selected in 1990 ROD)

The costs presented below are in 1990 dollars.

Route 72 Site

Estimated Capital Cost:	$18,000,000
Estimated Annual O&M Cost:	$ 6,400,000
Years of Operation:	30
Estimated Net Present Value:	$80,000,000

Route 532 Site

Estimated Capital Cost:	$ 5,200,000
Estimated Annual O&M Cost:	$ 1,100,000
Years of Operation:	30
Estimated Net Present Value:	$22,100,000

Total Estimated Net Present Value for both sites:	$102,000,000

This remedy consists of collection wells for the extraction of contaminated ground water, which would be treated and then reinjected back into the aquifer. The treatment of the ground water would consist of biodegradation, air stripping, and a polishing step, if needed, to attain treatment objectives. The polishing step would consist of either granular activated carbon or advanced chemical oxidation processes.

For the Route 72 site, all contaminated ground water would be extracted and treated at an estimated rate of between 965 gallons per minute (gpm) to 7,000 gpm (1.34 to 10 million gallons per day) to achieve most ARARs in approximately 30 years; the former pumping rate is the estimate provided in the original RI/FS Report (CDM, 1989) and the latter is an estimate based on recent ground water modeling presented in the Final Focused Feasibility Study.

For the Route 532 site, contaminated ground water from beneath the former disposal area would be extracted and treated at an estimated extraction rate of 400 gpm. This rate was estimated to prevent the further migration of the ground water contamination plume from beneath the former disposal site. The downgradient portion of the contamination plume would be allowed to naturally attenuate. It was estimated that the remaining ground water contamination plume would be removed in approximately 30 years.

At both sites, monitoring of ground water and surface water would continue until the ARARs are obtained. Although not an existing institutional control at the time the 1990 ROD was issued, ground water use would be managed with the identification of a Classification Exception Area within and immediately adjacent to the ground water contaminant plume at both sites until ARARs are obtained.

Alternative 2: Air Sparging and Soil Vapor Extraction

The costs presented below are in 1997 dollars.

Route 72 Site

Estimated Capital Cost:	$2,800,000
Estimated Annual O&M Cost:	$ 860,000
Years of Operation:	5
Estimated Net Present Value:	$9,000,000

Route 532 Site

Estimated Capital Cost:	$2,100,000
Estimated Annual O&M Cost:	$ 410,000
Years of Operation:	5
Estimated Present Value:	$5,500,000

Total Estimated Net Present Value for both sites:	$14,500,000

The remedy consists of (1) an air sparging system to inject air into the subsurface below the water table, a soil vapor extraction system installed above the water table to collect the sparged vapors, and a vapor collection system to treat off-gas vapor from the ground water and soils beneath the disposal area, and (2) natural attenuation of the downgradient ground water contaminant plume.

For the Route 72 site, sparging wells will be placed to an estimated depth of 15 to 30 feet below ground surface. The air sparging system will either inject air continuously or in pulsed modes depending on whichever is determined based on performance data to be most effective.

It is anticipated that the Route 72 site soil vapor extraction system would consist of vapor extraction wells located above the water table. The air sparging-soil vapor extraction system will be designed to remove as many of the organic contaminants above the first fine-grained layer (approximately the top 22 feet of the saturated zone) as possible. Only the volume of soil and water above the upper fine-grained layer is targeted because most of the site disposal area contamination resides in this zone. Volatilization and biodegradation would remove the VOCs, while the SVOCs would be removed mostly through biodegradation.

For the Route 532 site, the air sparging system would consist of sparging wells placed at an estimated depth of 12 to 35 feet below ground surface, corresponding to the depths just above and within the fine-grained unit, where the majority of the contamination lies. The air sparging system will either inject air continuously or in pulsed modes depending on whichever is determined based on performance data to be most effective. The soil vapor extraction system would remove VOCs by volatilization, oxidation and biodegradation, while the SVOCs would be removed mostly through oxidation and biodegradation.

The introduction of sparge air would be accomplished using low-pressure, oil-free air compressors at each site. Soil vapor extraction at each site would be accomplished using explosion-proof positive-displacement or regenerative blowers, each with a moisture separator and filter to protect the blower. Two units may be used to provide operating flexibility and to conserve power.

Vapor treatment at each site will be accomplished by either destructive oxidation and/or absorptive (e.g., activated carbon) technologies depending on the amount and types of contaminants present in the vapor stream during the period of operation.

The estimated time frame for air sparging-soil vapor extraction to complete ground water remediation is dependent on various factors including: well spacing, volumes of sparged air, subsurface geology, geochernistry, and the specific physical and chemical properties of the ground water contaminants. Results of predictive models have indicated that the proposed air sparging-soil vapor remedies for the former disposal areas at both sites will significantly remove the remaining contaminants present in ground water beneath the former disposal areas within six months to five years after start-up of the air sparging-soil vapor extraction remedies. These model predictions are consistent with results observed during the air sparging-soil vapor extraction pilot tests.

Natural attenuation would be implemented for the downgradient plume of each site. Routine and periodic sampling and analysis of ground water from selected monitoring wells would occur on at least an annual basis for approximately 30 years. Chemical transport modeling of the downgradient contaminant plumes and the source reduction/control provided by the air sparging-soil vapor extraction at the former disposal areas will result in ground water ARARs being attained at both sites in approximately 30 years or less.

Current institutional controls include security fences surrounding the former disposal areas at both sites which will remain in place until at least the completion of the air sparging-soil vapor extraction remedy at the disposal areas. A Classification Exception Area (CEA) and Well Restriction Area (WRA) will be implemented at both sites. The CEA will suspend the designated original uses of the ground water beneath each site until ground water ARARs are attained. The CEA at each site will consist of (1) a written description of and a map detailing the area at each site that does not meet current ground water ARARs as well as any known and anticipated ground water migration pathways, (2) a list of chemicals for which the CEA is being established, and (3) an estimated duration of the CEA. The WRA for each site will be established to prevent the use of ground water beneath the sites as potable water where ground water ARARs are exceeded. Finally, sentinel wells have been installed between the edge of the Route 72 site and Dukes Bridge and have been sampled periodically since 1994 with no detection of organic ground water contaminants. A sentinel well network will be established for the Route 532 site as part of the natural attenuation remedy. The sampling of the sentinel well networks will occur on an annual basis until it is shown by results of the natural attenuation monitoring that no further migration of the ground water plume is occurring because these data indicate that the contaminant plumes are retreating upgradient.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternatives in order to be eligible for selection:

Threshold Criteria

1. **Overall protection of human health and the environment**addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

Primary Balancing Criteria

3. **Long-term effectiveness and permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. **Reduction of toxicity, mobility, or volume through treatment** is the anticipated performance of the treatment technologies a remedy may employ.

5. **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and operation and maintenance costs, and net present worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

Modifying Criteria

8. **EPA acceptance** discusses if the support agency concurs with the remedy selected by the NJDEP.

9. **Community acceptance** is assessed based on a review of the public comments received on the technical reports and the Proposed Plan.

Route 72 Site

! Overall Protection of Human Health and the Environment

The ground water extraction and treatment remedy provides protection to human health by containing and treating the contaminated plume, but studies show that it may cause damage to the environment through lowering of the ground water table elevation associated with ground water extraction, which is particularly damaging to the wetlands; rise of ground water elevations associated with groundwater recharge; and physical impacts associated with the construction of the extraction and treatment system. As a result of those studies, NJDEP and USEPA believe that the ground water extraction and treatment remedy specified in the 1990 ROD would have to be modified in order to be implemented at the site.

Air sparging-soil vapor extraction provides protection of human health and the environment by rapid reduction of chemical mobility and volume in the site disposal area. This alternative provides active and aggressive remediation of contaminated ground water, saturated soil, and unsaturated subsurface soil, thereby permanently reducing the mass of constituents contributing to potential future risk.

! Compliance with ARARs

Applicable or relevant and appropriate requirements (ARARs) are those federal or state environmental and public health regulations that apply to remedial activities at a site. There are three classifications of ARARs: chemical-specific, which are health- or risk-based concentration limits; location-specific, which are based on the geographical location of the site and its surroundings; and action-specific, which are controls on particular types of remedial activities.

The ground water extraction and treatment remedy would eventually meet the chemical-specific ARARs in the ground water. However, it may take an extended period of time for all ARARs to be reached. The alternative would be able to meet requirements for air discharges by treating the off-gases from the proposed treatment plant.

Regarding location-specific ARARs, the ground water extraction, injection, and treatment systems would be designed and constructed to meet the intent of the Pinelands Management Plan with respect to preserving the pristine nature of the area for agricultural, ecological, and social reasons. However, action-specific ARARs would not be met since the land, streams, wetlands, vegetation, and the ecology will be significantly disturbed.

For the air sparging-soil vapor extraction system it is predicted that the chemical-specific ARARs in the site disposal area will be met in less than five years. The downgradient portion of the plume is predicted to reach ARARs through natural attenuation in less than 30 years.

Location-specific ARARs would be met since the air sparging-soil vapor extraction system would be designed to meet the intent of the Pinelands Management Plan with respect to preserving the pristine nature of the area for agricultural, ecological and social reasons.

Action-specific ARARs would be met since the air sparging-soil vapor extraction system would not impact the streams, wetlands, vegetation, ecology and cultural resources as would the ground water treatment and extraction system.

! Long-term Effectiveness

Both the ground water treatment and extraction remedy and the air sparging-soil vapor extraction remedy will reduce potential human health risks associated with the site

disposal area ground water. With both remedies, some residual contamination may remain adsorbed to the fine-grained units, however the risk associated with this contamination can be managed through institutional controls. Air sparging-soil vapor extraction will reduce concentrations of contaminants at the site disposal area more rapidly than pumping and treating.

! Reduction in Toxicity, Mobility, or Volume

The ground water extraction and treatment remedy would substantially eliminate the potential for further migration (mobility) of chemicals beyond the existing plume through hydraulic control and treatment. This alternative would reduce toxicity and volume in the site disposal area very slowly because many chemicals are expected to remain entrapped in the pore spaces and desorb very slowly. Air sparging-soil vapor extraction would provide direct, rapid, and permanent reductions in toxicity, mobility, and volume because it directly targets the areas impacting ground water.

! Short-term Effectiveness

There would be short-term adverse impacts to the ecology and environment from the construction equipment used during implementation of both the ground water extraction and treatment and air sparging-soil vapor extraction alternatives. The pump and treat system would cause a significant amount of damage because it requires a large amount of equipment and extensive construction in previously undisturbed areas. Disturbance and damage associated with air sparging-soil vapor extraction would be generally restricted to the site disposal area and existing downgradient monitoring well network.

! Implementability

The ground water extraction and treatment alternative requires further aquifer testing and pilot-scale testing before it can be designed and implemented. The reinjection system associated with this alternative has some implementability issues because the feasibility of injecting or recharging all the extracted ground water upgradient of the site without adversely impacting the environment is unknown but is judged to be difficult based on ground water modeling evaluations and a limited assessment of associated adverse environmental impacts conducted to date.

A pilot test of the air sparging-soil vapor extraction system was performed at the site and preliminary full-scale operating parameters have been evaluated. The system would use conventional equipment, which is available from several companies. Therefore, there are no major implementability issues with this technology.

! Cost (Route 72 site only)

The present worth cost for the existing ground water extraction and treatment remedy is estimated to be $80,000,000 in 1990 dollars for a thirty year period. The present worth

cost for the proposed air sparging-soil vapor extraction system, based on 5 years of operation and 30 years of ground water monitoring is $9,000,000 in 1997 dollars.

! USEPA Acceptance

The USEPA concurs with the proposed change to the ground water remedy.

! Community Acceptance

NJDEP solicited comments from the community on the proposed remedial alternatives for the contaminated ground water at both sites. The attached responsiveness summary addresses all verbal comments received at the public meeting as well as written comments received during the public comment period.

Route 532 Site

! Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would be maintained by current site conditions and institutional controls and would continue to be provided by each of the remedial alternatives. Both alternatives would allow for the natural attenuation of the downgradient plume. The ground water extraction and treatment alternative provides control over off-site ground water migrating from the site disposal area. This alternative would take a very long time to treat the contaminated ground water. The air sparging-soil vapor extraction remedy is anticipated to reduce chemical mass more quickly and is predicted to meet some ARARs in one-tenth the time predicted for the ground water extraction and treatment alternative, with little potential for adverse impact to environmental resources.

! Compliance with ARARs

Applicable or relevant and appropriate requirements (ARARs) are those federal or state environmental and public health regulations that apply to remedial activities at a site. There are three classifications of ARARs: chemical specific, which are health- or risk-based concentration limits; location-specific, which are based on the geographical location of the site and its surroundings; and action-specific, which are controls on particular types of remedial activities.

The ground water extraction and treatment alternative will likely achieve the chemical-specific ARARs in the ground water for the downgradient ground water plume in about 25 years. However, it is estimated that it will take a very long period of time to meet ARARs in the disposal area.

The location-specific ARARs would be met since the ground water extraction, injection, and treatment systems would be designed and constructed to meet the intent of the Pinelands Management Plan with respect to preserving the pristine nature of the

area for agriculture, ecological, and social reasons. However, the land, streams, wetlands, vegetation, and the ecology will be significantly disturbed.

Action-specific ARARs would not be met since the ground water extraction and injection systems would impact the streams, wetlands, vegetation, and ecology.

The air sparging-soil vapor extraction alternative will likely attain chemical-specific ARARs in as little as two to five years in most areas of the site disposal area. It is estimated that ARARs will be obtained in the downgradient plume in approximately 25 years.

The air sparging-soil vapor extraction system would meet location-specific ARARs since the system would be designed to meet the intent of the Pinelands Management Plan with respect to preserving the pristine nature of the area for agriculture, ecological and social reasons.

The air sparging system would meet action-specific ARARs since the system would not impact the streams, wetlands, vegetation, ecology, and cultural resources as would the ground water extraction and treatment system.

! Long-term Effectiveness

The long-term effectiveness of the ground water extraction and treatment alternative is satisfactory. It can slowly reduce chemical concentrations within the aquifer, but may not reduce levels within the site disposal area to meet ARARs in a reasonable time frame. The air sparging-soil vapor extraction system would rapidly reduce the site disposal area chemical mass, thereby rapidly reducing chemical concentrations which may contribute to potential future risks.

! Reduction of Toxicity, Mobility, or Volume

The ground water extraction and treatment alternative would substantially eliminate off-site migration (mobility) of the site disposal area compounds through hydraulic control and treatment. This alternative would also reduce toxicity and volume in the site disposal area, though very slowly, because many chemicals are expected to remain entrapped in the pore spaces and desorb very slowly. The air sparging-soil vapor extraction alternative would provide direct, rapid, and permanent reductions in toxicity and volume because it targets the areas impacting ground water quality.

! Short-term Effectiveness

There would be short-term adverse impacts to the ecology and environment from the construction equipment used during implementation of both the ground water extraction and treatment alternative and the air sparging and soil vapor extraction alternative. The ground water extraction and treatment alternative is likely to cause more damage than the air sparging-soil vapor extraction alternative because it requires

the largest amount of equipment and construction, and some of the construction would occur in previously undisturbed areas.

- Implementability

  Both alternatives would be technically feasible to implement. The ground water extraction and treatment alternative requires further aquifer testing and pilot-scale testing before it can be designed and implemented. The ground water extraction and treatment alternative requires more testing to provide design information than the air sparging-soil vapor extraction alternative. The air sparging-soil vapor extraction alternative can be implemented more rapidly. The reinjection system associated with the ground water extraction and treatment alternative has some implementability issues because the feasibility of injecting all the extracted ground water upgradient of the site without adversely impacting the environment is unknown, but is judged to be difficult based on ground water modeling evaluations conducted to date.

- Cost (Route 532 site only)

  The present worth cost for the existing ground water extraction and treatment remedy is estimated in 1990 dollars to be $22,100,000 for thirty years of operation. The present worth cost for the air sparging-soil vapor extraction alternative is estimated to be $5,500,000 in 1997 dollars, which is based on five years of operation and 30 years of ground water monitoring.

- USEPA Acceptance

  The USEPA concurs with the proposed change to the ground water remedy.

- Community Acceptance

  NJDEP solicited comments from the community on the proposed remedial alternatives for the contaminated ground water at both sites. The attached responsiveness summary addresses all verbal comments received at the public meeting as well as written comments received during the public comment period.

SELECTED REMEDY

After reviewing the alternatives and public comments, NJDEP and EPA have determined that Alternative 2 is the appropriate remedy for the sites because it best satisfies the requirements of CERCLA §121, 42U.S.C. §9621, and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9).

The major components of the modified remedy are as follows:

- Ground water in the site disposal areas at both the Route 72 and Route 532 sites will be remediated using an air sparging system to inject air into the saturated zone and strip away volatile and semi-volatile organic compounds dissolved in ground water and adsorbed to the soil; a soil vapor extraction system to capture sparged vapors; and a vapor treatment system to treat the soil vapor extraction offgas.

- The downgradient portion of the plumes at both sites will be allowed to naturally attenuate.

CONTINGENCY REMEDY

A contingency remedy will be implemented at each site if any of the following conditions occur. The contingency remedy for both sites will consist of a ground water extraction and treatment system. This system would be modified from the system described in the 1990 ROD.

A formal workplan for Natural Attenuation complying with all Federal and State requirements for implementing that portion of the remedy at each site will be submitted to NJDEP and USEPA. In accordance with OSWER directive 9200.4-1, if it is determined that the Natural Attenuation remedy for the downgradient plumes at each site is not adequately protective of human health and the environment, the Contingency Remedy or another technology of equal or greater effectiveness will be implemented. Any technology other than the Contingency Remedy will be subject to public comment.

The ground water monitoring program will include quarterly ground water monitoring for at least 8 quarters. This will include monitoring for VOCs, SVOCs, and all of the inorganic contaminants identified in the 1990 ROD with ground water remedial ARARs. Based on monitoring, if it is determined that the air sparging/soil vapor extraction remedial action is no longer decreasing the levels of contamination and levels of contamination remain on-site at levels requiring active remediation, the Contingency Remedy or another technology of equal or greater effectiveness will be implemented. Any technology other than the Contingency Remedy will be subject to public comment.

The FFS states that ground water flow modeling indicated that the plume discharges into the Pope and Shoal Branch wetlands rather than intercepting the potable water wells at Dukes Bridge. However, if the ground water monitoring program reveals that the conclusions of the FFS are incorrect and the ground water plume is migrating toward the potable water wells at Dukes Bridge, then the Contingency Remedy or another technology of equal or greater effectiveness will be implemented. Any technology other than the Contingency Remedy will be subject to public comment.

STATUTORY DETERMINATIONS

As previously noted, CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121 (b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621 (d) further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4). For the reasons discussed below, NJDEP has determined that the selected remedy at the Woodland Township Route 72 and Route 532 sites meets the requirements of CERCLA §121, 42 U.S.C. §9621.

Protection of Human Health and the Environment

Of the two alternatives evaluated, the selected remedy for contaminated ground water provides the greatest protection of human health and the environment. Air sparging and soil vapor extraction will remediate the contamination in the former disposal areas faster than ground water extraction and treatment. Human health will be protected through the implementation of a Classification Exception Area (CEA) and a Well Restriction Area (WRA). Security fences surrounding the former disposal areas at both sites will remain in place until at least the completion of the air sparging-soil vapor extraction remedy at the disposal areas.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The selected remedy will meet all chemical-specific, action-specific, and location-specific ARARs discussed under the "Summary of Comparative Analysis of Alternatives", above.

Cost Effectiveness

The cost effectiveness of an alternative is determined by weighing the cost against the alternative's ability to achieve ARARs and remedial action objectives. The selected remedy is cost effective and will cost approximately $87,600,000 less than ground water extraction and treatment.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected technology utilizes permanent solutions and treatment technologies to the maximum extent practicable and provides the best balance of trade-offs with respect to the nine evaluation criteria previously discussed.

Preference for Treatment as a Principal Element

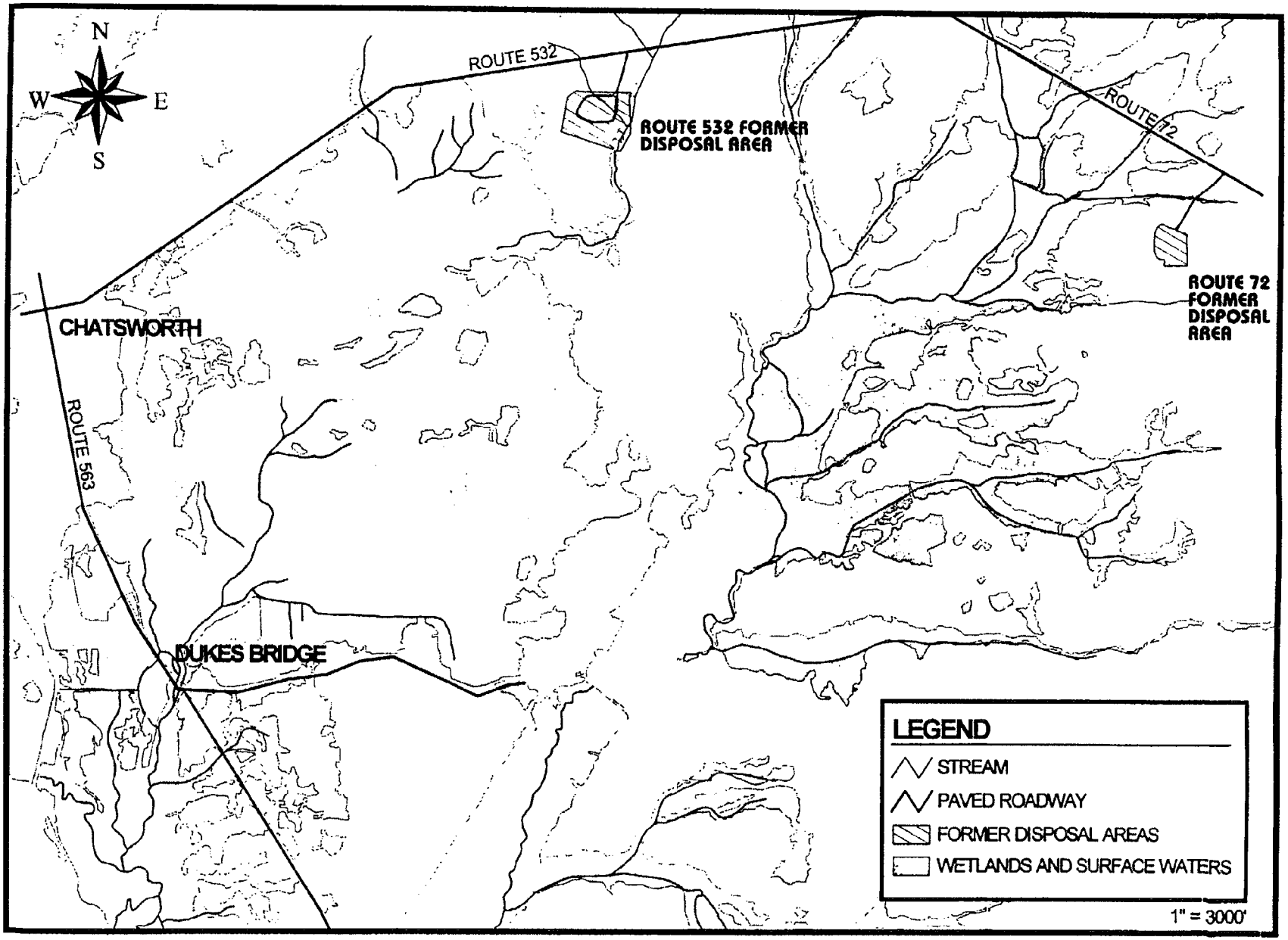
The selected technology meets the statutory preference for treatment as a principle element.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Woodland Township Route 72 and Route 532 sites ROD Amendment was released for public comment on September 22, 1998. The proposed plan identified Alternative 2 as the preferred remedy for the sites. The notice of availability for these documents was published in the *Burlington County Times* on September 22, 1998. A public comment period was held from September 22, 1998 to October 22, 1998. NJDEP has reviewed all written comments submitted during the public comment period. In addition, a public meeting was held on October 8, 1998. A response to comments raised at the public meeting and provided in writing is included in the Responsiveness Summary, which is part of this ROD Amendment. Upon review of the comments, NJDEP determined that no significant changes to the remedy, as it was originally defined in the Proposed Plan, were necessary.

APPENDIX I

FIGURE



04/20/98

ROUTE 72 AND ROUTE 532 SUPERFUND SITES
Woodland Township, Burlington County, New Jersey

APPENDIX II

TABLES

Table 1
Maximum Detected Chemical Concentrations in Groundwater - Route 72 Superfund Site

Constituent	Maximum Detected Groundwater Concentration (ug/l)
Volatiles	
1,1-Dichloroethene	43
1,2-Dichloroethane	7,800
1,2-Dichloroethene (total)	850
1,2-Dichloropropane	320
1,1,2-Trichloroethane	380
1,1,2,2-Tetrachloroethane	730
2-Butanone	270
4-Methyl-2-Pentanone	140
Acetone	1,600
Benzene	2,700
Carbon Disulfide	420
Carbon Tetrachloride	39
Chlorobenzene	12,000
Chloroform	80
Chloromethane	50
Ethylbenzene	15,000
Methylene Chloride	370
Styrene	13,000
Tetrachloroethene	99
Toluene	52,000
Trichloroethene	4,000
Vinyl Chloride	5
Xylene	11,000
Semil-volatiles	
1,2-Dichlorobenzene	1,500
1,2,4-Trichlorobenzene	74
1,3-Dichlorobenzene	55
1,4-Dichlorobenzene	220
2-Chlorophenol	38
2-Methylnaphthalene	140
2-Methylphenol	810
2-Nitroaniline	28
2,2-Oxybis(1-chloropropane)	560
2,4-Dimethylphenol	1,080
2,4,5-Trichlorophenol	40
2,4,6-Trichlorophenol	4
4-Methylphenol	2,200
Acenaphthene	10
bis(2-Chloroethyl)Ether	2,000
bis(2-Chloroisopropyl)ether	860
bis(2-Ethylhexyl)Phthalate	480
Benzyl alcohol	850
Butylbenzylphthalate	51
Dibenzofuran	32
Di-n-Butyl phthalate	93
Di-n-Octylphthalate	99
Diethylphthalate	160
Fluorene	27

Table 1
Maximum Detected Chemical Concentrations In Groundwater - Route 72 Superfund Site

Constituent	Maximum Detected Groundwater Concentration (ug/l)
Naphthalene	120
Phenol	340
Phrenathrene	3
Metals	
Aluminum	1,100
Arsenic	30
Cadmium (total)	37
Calcium (total)	9,700
Chromium	630
Cobalt	26
Iron	132,000
Lead	32
Magnesium	7,500
Manganese	730
Mercury	1.1
Nickel	90
Potassium	14,400
Sodium	14,200
Zinc	35,000

Maximum concentrations in groundwater samples collected and analyzed since June 1991 from permanent monitoring wells and/or Hydropunch**9** samples.

c /WOODLANDS/Maximum Detected Chemical Concentrations in Groundwater - Rte 72/sls

Table 2
Maximum Detected Chemical Concentrations in Groundwater - Route 532 Superfund Site

Constituent	Maximum Detected Groundwater Concentration (ug/l)
VOCS	
1,1-Dichloroethane	5
1,1-Dichloroethene	300
1,1,1-Trichloroethane	27
1,1,2-Trichloroethane	230
1,1,2,2-Tetrachloroethane	6,400
1,2-Dichloroethane	60,000
1,2-Dichloroethene (total)	35
1,2-Dichloropropane	240
2-Butanone	660
2-Hexanone	300
4-Methyl-2-Pentanone	1,800
Acetone	4,400
Benzene	1,800
Bromodichloromethane	1
Carbon Disulfide	610
Carbon Tetrachloride	41
Chlorobenzene	510
Chloroform	1,200
Ethylbenzene	1,500
Methylene Chloride	620
Styrene	2,600
Tetrachloroethene	700
Toluene	40,000
Trichloroethene	790
Xylene	10,000
Semi-Volatiles	
2-Methylphenol	1,800
2,4-Dimethylphenol	14,000
4-Methylphenol	3,100
bis(2-Chloroethyl)ether	200,000
bis(2-Ethylhexyl)phthalate	77
Benzoic acid	390
Benzyl alcohol	2,800
Butylbenzylphthalate	2
Di-n-Butyl phthalate	17
Di-n-Octylphthalate	4
Dibenzofuran	25
Diethylphthalate	85
Dimethylphthalate	330
Naphthalene	40
Phenanthrene	1
Phenol	14,000
Metals	
Aluminum	128,000
Calcium (total)	106,000
Cadmium	97
Chromium	350

Table 2
Maximum Detected Chemical Concentrations in Groundwater - Route 532 Superfund Site

Constituent	Maximum Detected Groundwater Concentration (ug/l)
Cobalt	50
Iron	63,500
Lead	155
Magnesium	9,300
Manganese	30,000
Mercury	0.2
Nickel	350
Potassium	10,200
Sodium	40,500
Vanadium	440
Zinc	79,000

Maximum concentrations in groundwater samples collected and analyzed since June 1991 from permanent monitoring wells and/or Hydropunch**9** samples.

MF|WOODLANDS|Maximum Detected Chemical Concentrations in Groundwater - Rte 532|sls

TABLE 3

Ground Water Remediation Goals

Constituent	ug/l
Acenaphthene	10
Acetone	25
Aldrin	0.04
Aluminum	200
Ammonia	200
Arsenic	8
Barium	200
Benzene	1
Benzidine	50
Benzyl alcohol	4
Bis(2-chloroethyl)ether	10
Bis(2-chloroisopropyl)ether	10
Bis(2-ethylhexyl)phthalate	30
Bromodichloromethane	1
2-Butanone	100
Butylbenzyl phthalate	20
Cadmium	2
Carbon disulfide	5
Carbon tetrachloride	2
Chlordane	0.5
Chloride	2000
Chlorobenzene	2
Chloroform	1
Chloromethane	2
2-Chlorophenol	20
Chromium	10
Color	20 CU
Copper	1000
Cyanide	40
4-4 DDT	0.06
Dibenzofuran	4
1,2-Dichlorobenzene	5
1,3-Dichlorobenzene	5
1,4-Dichlorobenzene	5
1,1-Dichloroethane	2
1,2-Dichloroethane	2
1,1-Dichloroethylene	2
cis-1,2-Dichloroethylene	2
trans-1,2-Dichloroethylene	2
1,2-Dichloropropane	1
Diethyl phthalate	10

Constituent	ug/l
2,4-Dimethyl phenol	20
Dimethyl phthalate	10
Di-n-butyl phthalate	20
Di-n-octyl phthalate	2
Endrin	0.04
Ethylbenzene	5
Fluoride	500
Fluorene	10
2-Hexanone	25
Iron	100
Isophorone	10
Lead	10
Manganese	6
Mercury (total)	0.5
4-Methyl 2-pentanone	50
Methylene chloride	2
2-Methylnapthalene	4
2-Methylphenol.	20
4-Methylphenol	20
Naphthalene	2
Nickel	10
2-Nitroaniline	3
PCBs	0.5
Phenathrene	10
Phenol	10
Selenium	10
Silver	2
Sodium	400
Styrene	5
Sulfate	5000
1,1,2,2-Tetrachloroethane	1
Tetrachloroethylene	1
Toluene	5
Total Dissolved Solids	10,000
Toxaphene	3
1,2,4-Trichlorobenzene	1
1,1,1-Trichloroethane	1
1,1,2-Trichloroethane	2
Trichloroethene	1
2,4,5-Trichlorophenol	10
2,4,6-Trichlorophenol	20
Vinyl Chloride	2
Xylenes (total)	2
Zinc	30